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EYES ON AN AOC: DISSEMINATING MUSKEGON LAKE BUOY OBSERVATORY DATA

Muskegon Lake

- ⦿ Drowned river mouth lake
- ⦿ History of anthropogenic stress
- ⦿ 1 of 10 AOCs in the Lake Michigan Basin
- ⦿ Currently:
 - Shoreline Restoration
 - Remediation of contaminated sediment

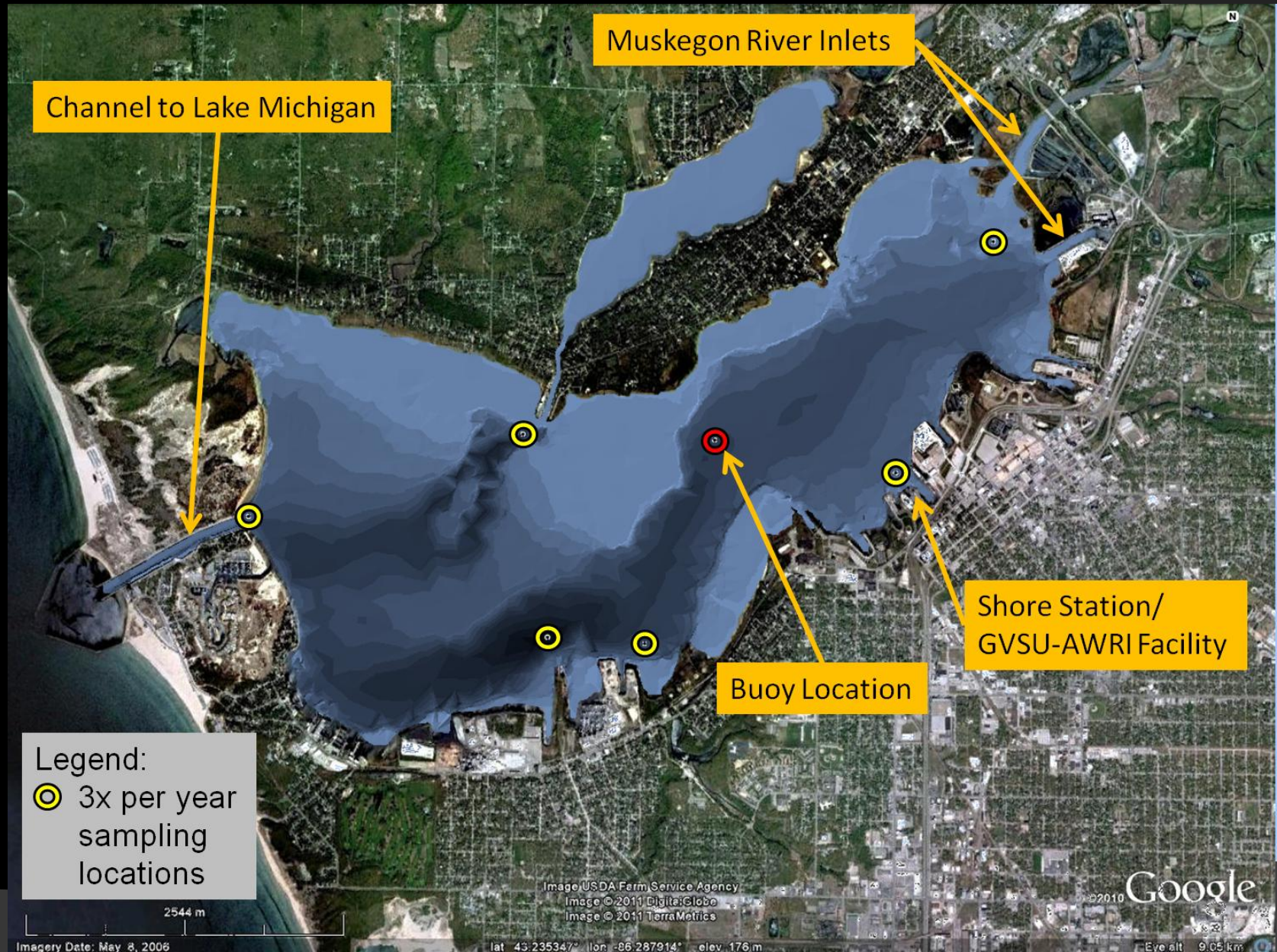


Buoy observatory

- ◎ Three year buoy monitoring observatory
- ◎ Measures meteorological, water quality, and water current parameters

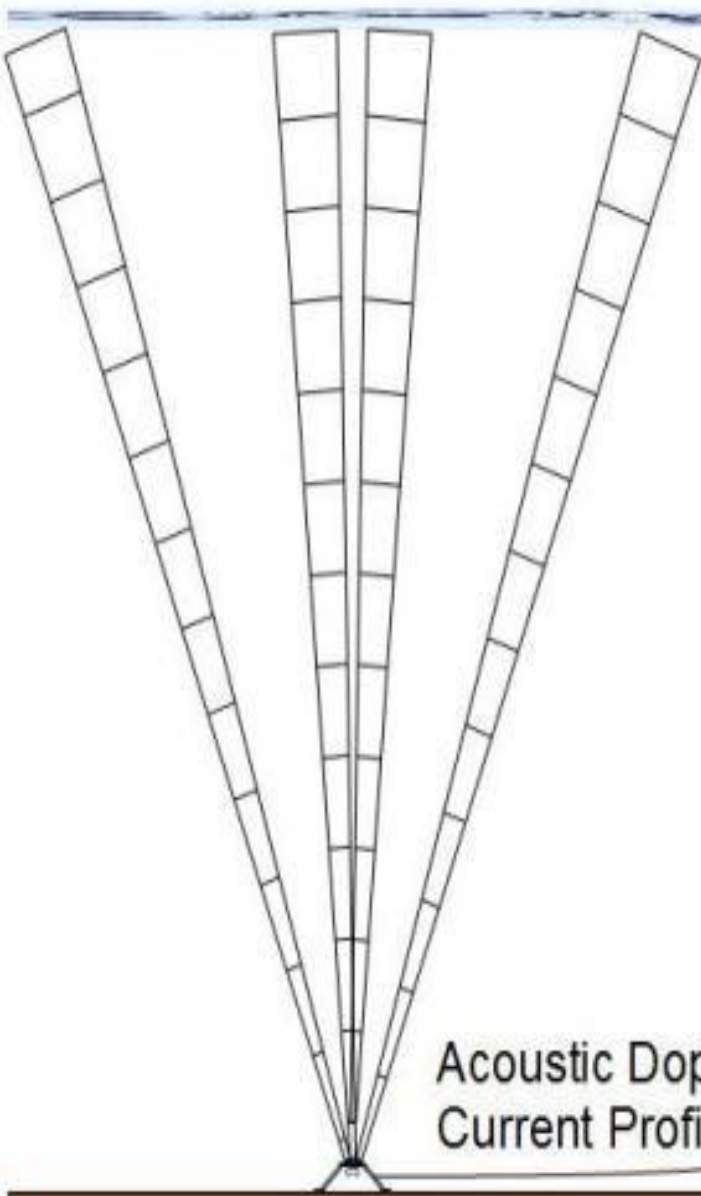


Seasonal Sampling Sites and the Continuous Observatory Locations



Surface Buoy w/ Wind, Temp., Pressure,
Precipitation, Humidity Sensors

Subsurface Buoy w/ Sensors



Acoustic Doppler
Current Profiler



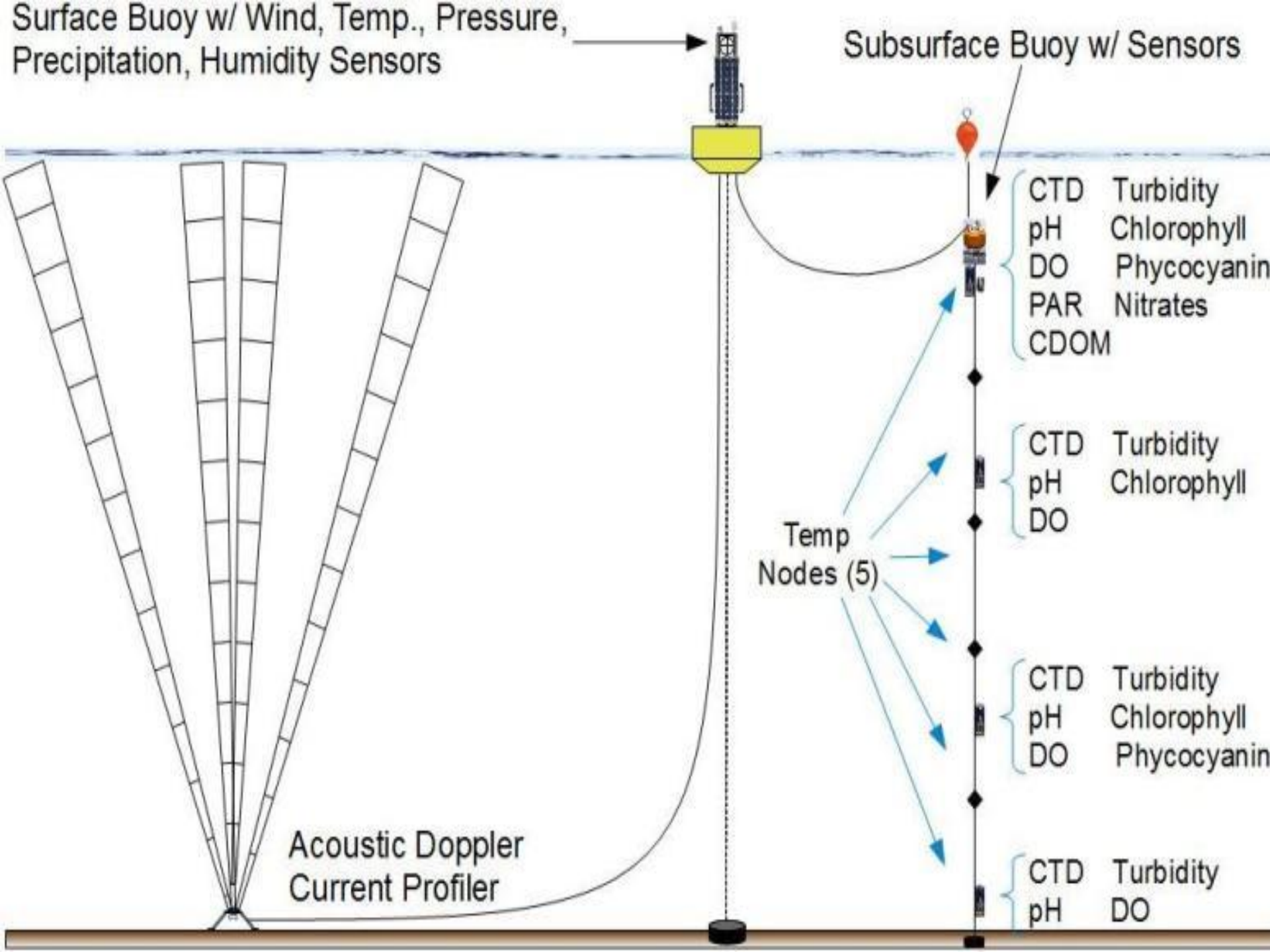
CTD Turbidity
pH Chlorophyll
DO Phycocyanin
PAR Nitrates
CDOM

CTD Turbidity
pH Chlorophyll
DO

CTD Turbidity
pH Chlorophyll
DO Phycocyanin

CTD Turbidity
pH DO

Temp
Nodes (5)



Where does the data go
from here?



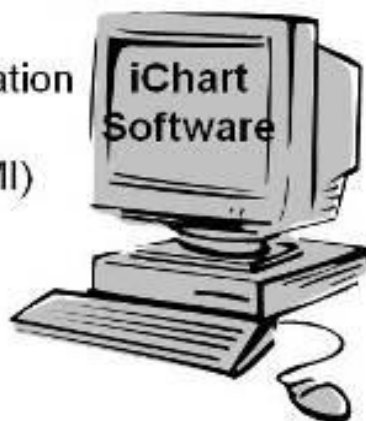
GVSU Off-site Data
Backup
(Allendale, MI)

Provisional Hourly Data
(w/ iChart automated flags)



Archived QA/QC
Database

AWRI Shore Station
Server
(Muskegon, MI)



QA/QC & Post-
Calibration Update

Daily, Weekly,
Biweekly Queries of
Database



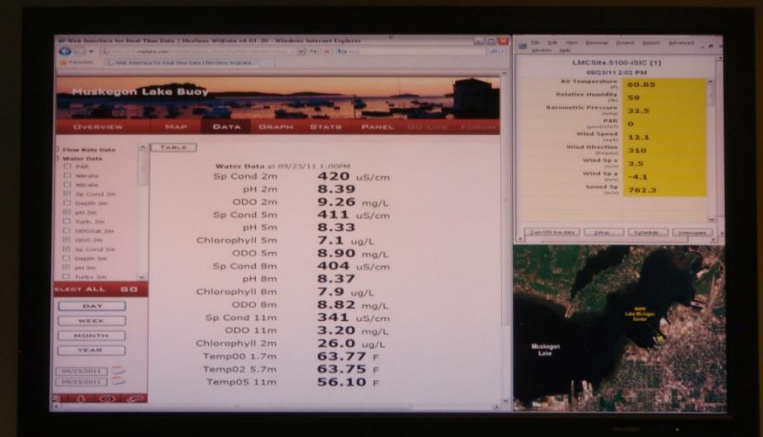
Muskegon Lake
Buoy System



Server In Lab



Display in Hall



**Troubles disseminating data
beyond our institution**

Individual

- ◎ Computer expertise
 - Data manipulation
- ◎ Understanding management systems already in place

Institutional

- ◎ Network constraints
 - IP Management
- ◎ Web management already in place

Observatory Collaboration

- ◎ Some standard procedures are already in place, but are they enough for AOCs?

GLOS

- Common site for retrieving observatory data from around Great Lakes

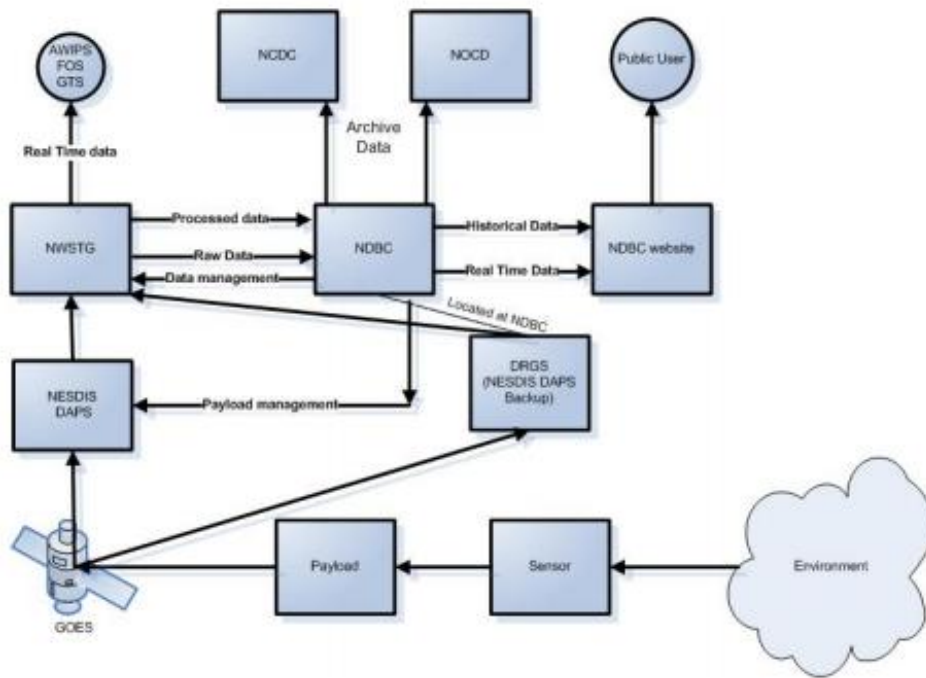
The screenshot displays the 'GREAT LAKES OBSERVING SYSTEM' (GLOS) 'OBSERVATIONS EXPLORER' web application. The interface features a blue header with the GLOS logo and navigation tabs: 'Station Type', 'Station Info', 'Available Data', 'Record of The Day', 'Search Station', and 'Ship Report'. A map of the Great Lakes region is shown on the left, with various cities and locations marked. On the right, a list of station types is displayed with corresponding icons and checkboxes: C-Man Stations, Weather Station, Water Level Station, GLOS Buoy, USGS Water Gauge, GLOS Weather Station, 3-meter Discus Buoy, Canadian Buoy, NERRS Weather Station, ASOS Station, and Other Marine Reports. Below the map, a text prompt reads: 'Choose a station, then select a parameter from the Available Data tab to get a quick view of the latest data (up to 7 days)'. At the bottom, there is a disclaimer: 'Disclaimer: All products published on this website are prototype products and are not intended to be used for navigational or operational purposes. Due to atmospheric or other conditions, latest data may not always be available. [View full disclaimer.](#)' and a footer with contact information: '© Great Lakes Observing System, 229 Nickels Arcade | Ann Arbor, MI 48104, [comments@glos.us](#)'.

IOOS and NDBC

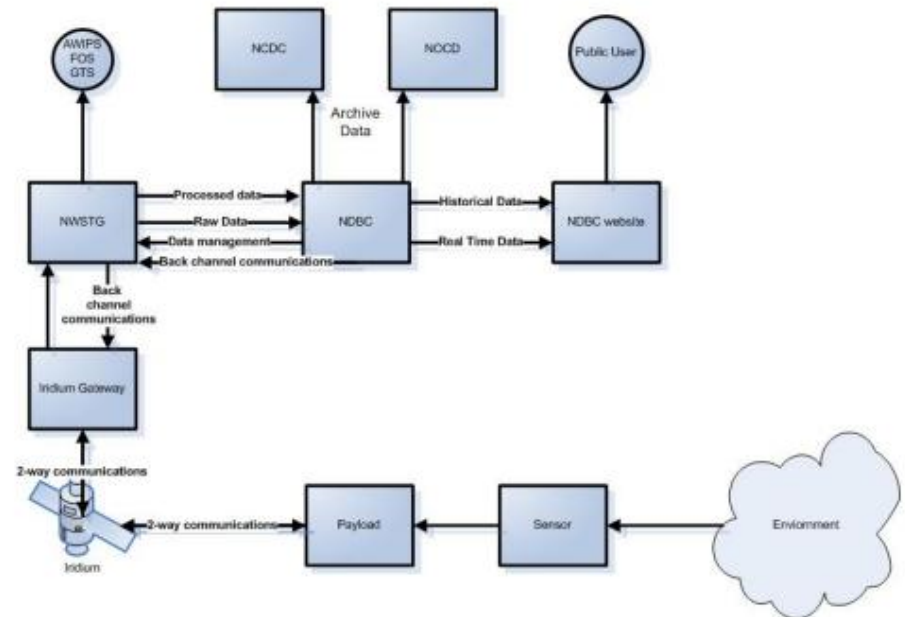
- IOOS Data Management and Communications (DMAC)
- NDBC Data Quality Control Checks and Procedures



**Two problems integrating
AOCs into these systems**



Methods can be complicated



Limited number of parameters

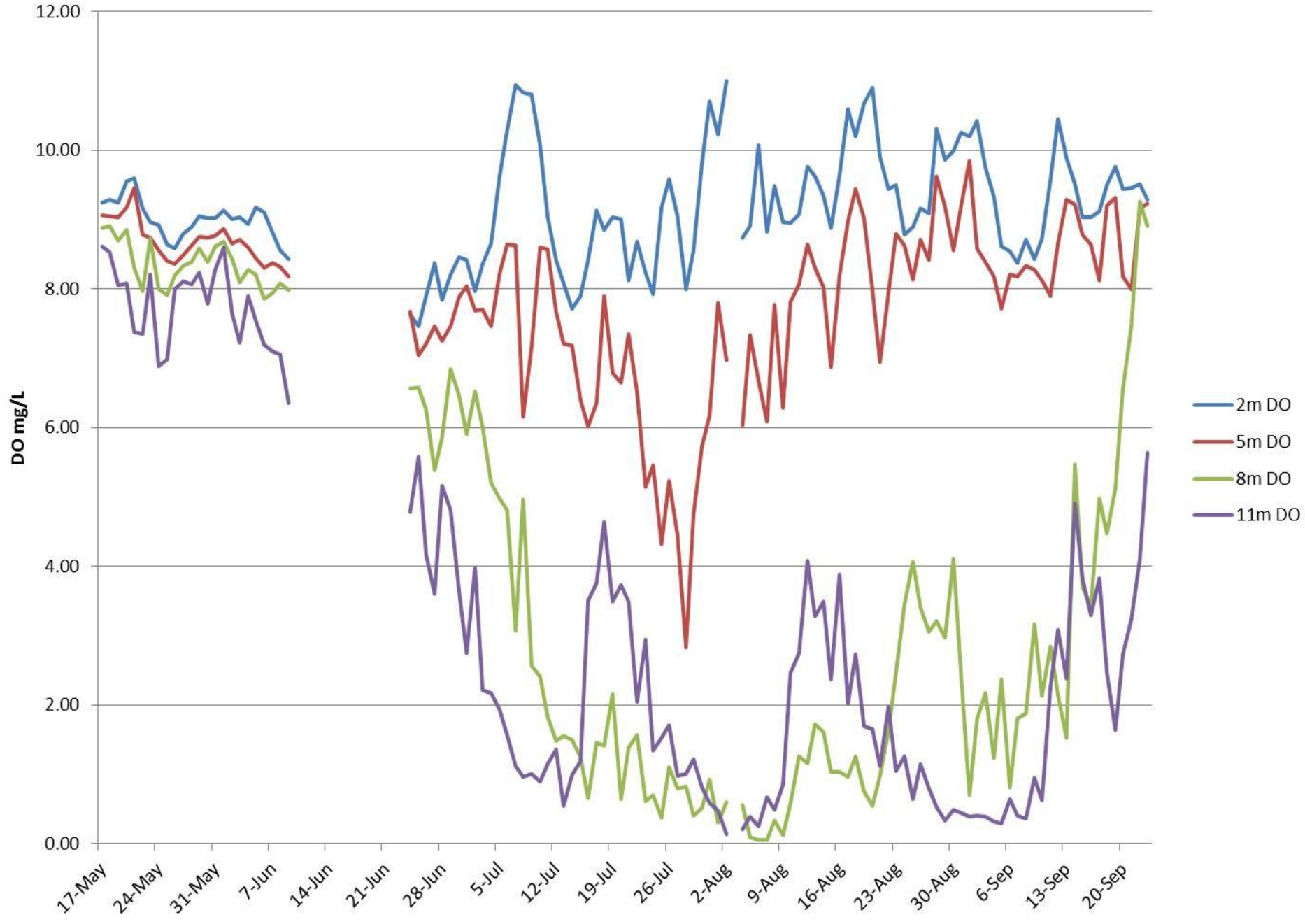
Beyond meteorological parameters

- ◎ AOCs are concerned with a vast array of parameters
 - Biological and chemical parameters are important

Muskegon Lake BUIs

- ◎ Loss of fish/wildlife habitat
- ◎ Degradation of fish/wildlife population
- ◎ Degradation of benthos
 - Hypoxia
- ◎ Restrictions on dredging
 - Turbidity and Sediment Transport
- ◎ Degradation of aesthetics and eutrophication/undesirable algae
 - Chlorophyll and Phycocyanin

Daily Avg DO



A simple step forward

- ◎ XML is already standard
- ◎ Many parameters already in place
- ◎ Integration of new parameters crucial to AOCs
- ◎ Integrate into existing systems?
- ◎ Share data at an institutional level?

Good news!

- ◎ Data is available

- <http://www.gvsu.edu/buoy>

- ◎ *Key data trends will be shown*

- *See presentation by Biddanda et al
Nutrients/TMDL Session Wednesday 8.50
AM*

Thank You

- ◎ Annis Water Resources Institute, GVSU
- ◎ EPA-GLRI
- ◎ NOAA-GLERL
- ◎ GLOS and GLC
- ◎ Nexsens Technologies
- ◎ Fondriest Environmental

Questions?

